

## ABSTRACT

A technique of estimating electrical parameters of an earth formation accounts for spatial inhomogeneities and frequency dispersion. The results are achieved using a model which is evaluated to generate predicted values for a plurality of electrical signals measured in a borehole in an earth formation as a function of a first set of model electrical parameters, a second set of model electrical parameters and model spatial coordinates of boundaries between regions of the earth formation. Transformations are applied to the measured electrical signals and the predicted values. The electrical parameters and spatial coordinates are selected to cause approximate agreement between the transformed measurements and the transformed predicted values. In some embodiments, the first set of electrical parameters is a set of conductivity values; the second set of electrical parameters is a set of dielectric constant values; and the spatial coordinates define regions of the earth formation where different values for the conductivity and dielectric constant apply.